

SMOKING

Clinical trial comparing nicotine replacement therapy (NRT) plus brief counselling, brief counselling alone, and minimal intervention on smoking cessation in hospital inpatients

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Background: Guidelines recommend that smoking cessation interventions are offered in all clinical settings to all smokers willing to make a quit attempt. Since the effectiveness of routine provision of behavioural counselling and nicotine replacement therapy (NRT) to smokers admitted to hospital has not been established, a randomised controlled trial of these interventions given together compared with counselling alone or minimal intervention was performed in hospital inpatients.

Methods: Medical and surgical inpatients who were current smokers at the time of admission were randomised to receive either usual care (no additional advice at admission), counselling alone (20 minute intervention with written materials), or NRT plus counselling (counselling intervention with a 6 week course of NRT). Continuous and point prevalence abstinence from smoking (validated by exhaled carbon monoxide <10 ppm) was measured at discharge from hospital and at 3 and 12 months, and self-reported reduction in cigarette consumption in smokers was assessed at 3 and 12 months.

Results: 274 inpatient smokers were enrolled. Abstinence was higher in the NRT plus counselling group (n=91) than in the counselling alone (n=91) or usual care (n=92) groups. The difference between the groups was significant for validated point prevalence abstinence at discharge (55%, 43%, 37% respectively, $p=0.045$) and at 12 months (17%, 6%, 8%, $p=0.03$). The respective differences in continuous validated abstinence at 12 months were 11%, 4%, 8% ($p=0.25$). There was no significant difference between counselling alone and usual care, or in reduction in cigarette consumption between the treatment groups.

Conclusions: NRT given with brief counselling to hospital inpatients is an effective routine smoking cessation intervention.

Smoking is the greatest preventable cause of mortality and morbidity in the developed world,^{1,2} and smoking cessation interventions involving behavioural support and nicotine or bupropion pharmacotherapy in primary care and in specialist cessation clinics are effective and highly cost effective.^{3–5} However, the role of these interventions in patients admitted to hospital, many of whom are smokers, has not been clearly established. Intensive behavioural support has been shown to be effective in inpatients with cardiovascular disease^{6–8} but is logistically difficult to deliver as a routine service to all smoking inpatients. Less intensive counselling would be more suitable for widespread application, but studies in unselected patients^{9–10} and patients with cardiovascular disease¹¹ have found no evidence of benefit. Studies of nicotine replacement therapy (NRT) in hospital inpatients to date have been relatively small, and although suggestive of a beneficial effect, have not shown significant differences relative to placebo,^{12–15} results supported by a systematic review of the subject.¹⁶ We have therefore conducted a pragmatic open randomised controlled trial to determine whether a brief cessation counselling intervention suitable for widespread use, or the same counselling intervention given with NRT, is more effective than usual care in promoting smoking cessation in patients admitted to a UK teaching hospital.

METHODS

Participants

All medical and surgical admissions admitted to Nottingham City Hospital between March 1999 and April 2000 were

screened by a research doctor or nurse within 48 hours of admission (see box 1 for eligibility criteria) and all current smokers—defined as those who described themselves as regular smokers and who had smoked their last cigarette within 28 days of admission—were invited to participate. All consenting individuals were enrolled and provided questionnaire details of smoking history, Fagerström test of nicotine dependence,¹⁷ smoking behaviour (Glover-Nilsson smoking behavioural questionnaire¹⁸), and completed the SF-36 quality of life questionnaire.¹⁹ Details of the main admission diagnosis and significant past medical history were recorded. Exhaled carbon monoxide was measured using a Bedfont Micro-Smokerlyzer (Bedfont Scientific Ltd, UK). The original protocol also proposed to use similar methods to recruit patients at St George's and King's College Hospitals in London; participation was low at these centres and recruitment was therefore abandoned at 3 and 8 months, respectively. The study was approved by the local research ethics committees at each hospital.

Interventions

Patients were randomised to one of three treatment groups following enrolment using a list generated for each centre, allocating equally in random permuted blocks of nine.

(1) Usual care: these patients had smoking status recorded but received no additional formal intervention.

(2) Counselling alone: a research doctor or nurse trained in smoking cessation counselling gave a 20 minute counselling

Box 1 Eligibility criteria for patients**Inclusion criteria**

- Male and female medical and surgical inpatients who were smokers whose last cigarette was within 28 days before admission.
- Able to provide written informed consent and understand English.
- 18 years of age or older.
- Expected to comply with the protocol.
- An acceptable level of consciousness.
- Expected duration of hospitalisation of at least 24 hours.
- Planning to remain at their current address for the next 12 months.
- Access to the telephone.
- Resident within a reasonable travelling distance from the hospital.

Exclusion criteria

- Pregnant (including suspected pregnancy), planned pregnancy, or breast feeding.
- Admission for psychiatric care.
- History of alcohol and/or illicit drug abuse in the last 12 months.
- Terminal illness (prognosis less than 12 months).
- Concurrent use of another investigational medication and within 1 month of entry into this study.
- Hypersensitivity towards nicotine or menthol.
- Previous enrolment into this study.
- Acute cerebrovascular accident.

session at the bedside and provided a written advice leaflet. Patients were advised of the effectiveness and availability of NRT.

(3) NRT plus counselling: a research doctor or nurse gave counselling as above and also offered a 6 week course of NRT. Patients were advised on the use of NRT and offered a choice of one of five different open labelled products (nicotine transdermal patch (15 mg, 16 hours), nicotine gum (2 or 4 mg), nicotine inhalator (10 mg), nicotine sublingual tablet (2 mg), or nicotine nasal spray (0.5 mg/spray), Pharmacia Ltd, UK) which were then dispensed at the first visit and used according to product licence.

Follow up

All patients were asked whether they had smoked since enrolment, details of any adverse events were elicited, and exhaled carbon monoxide was measured immediately before discharge or at 7 days after enrolment, whichever was sooner. All patients were also invited to attend for review or interviewed by telephone 3 and 12 months after enrolment to ascertain whether they had smoked since their last visit, any adverse events, whether they had purchased any additional NRT, and to complete the SF-36 quality of life questionnaire. Exhaled carbon monoxide was measured in all patients who reported not smoking by home visit in those who were reviewed by telephone. Patients who did not attend their follow up appointments and/or could not be contacted after a minimum of two telephone calls were considered lost to follow up and assumed to be smoking.

Sample size and power

Our original power calculation assumed that each hospital would admit an average of four eligible smokers per day, yielding 540 patients per centre in 6 months and 1620 patients (540 patients in each treatment group) in total. Assuming that 5% of patients in usual care would not be smoking at 12 months, this sample size would have provided approximately 90% power at 5% significance to detect a doubling of the cessation rate to 10.2% at 12 months in the NRT plus counselling group. In the event the final sample size was lower than

planned, mainly because the study was abandoned at two centres before completion of follow up.

Analysis of data

The primary outcome measure was continuous abstinence (defined as abstinence from any smoking from enrolment) validated by an exhaled carbon monoxide measurement of <10 parts per million (ppm) at discharge, 3 months and 12 months. Secondary outcome measures were point prevalence validated abstinence (defined as abstinence from any smoking since the previous visit) at discharge, 3 months and 12 months, reduction in cigarette consumption in those still smoking (measured as change from baseline in cigarettes per day) at 3 and 12 months, and quality of life at 3 and 12 months computed in terms of the eight dimensions of SF-36.¹⁹ Analysis was performed on an intention-to-treat basis using χ^2 tests and risk ratios with 95% confidence intervals (CI) to compare abstinence at each follow up and, where significant, post hoc pairwise comparisons were performed. Absolute cigarette consumption in those who continued to smoke, measured as self-reported cigarettes per day, was compared between groups by the Kruskal-Wallis non-parametric test with post hoc pairwise comparisons using the Mann-Whitney U test.

RESULTS**Baseline characteristics and rates of follow up**

A total of 1068 patients were screened at Nottingham City Hospital, of whom 274 (26%) were eligible and consented to be enrolled, 92 to usual care, 91 to counselling alone, and 91 to NRT plus counselling (fig 1). Baseline characteristics (table 1) and admission diagnoses (table 2) did not differ significantly between the treatment groups. Of those randomised to receive counselling and NRT, 57 (63%) chose a transdermal patch, 12 (13%) chose an inhalator, 10 (11%) chose gum, seven (8%) chose sublingual tablets, and one (1%) chose the nasal spray; four patients (4%) declined to use any NRT. Reviews were carried out in the total patient population at discharge in 251 (92%), at 3 months in 171 (62%), and at 12 months in 112 (41%, fig 1). Most of those lost to follow up did not attend their appointment and could not be contacted by telephone, although a small number were excluded after enrolment because they were discharged within 24 hours of admission.

Abstinence from smoking and reduction in consumption

Validated abstinence at discharge was significantly higher in the NRT plus counselling group than in the counselling alone or usual care groups (55%, 43% and 37% respectively, $p=0.045$, table 3) with a risk ratio (RR) for validated abstinence in those receiving NRT relative to those who were not of 1.38 (95% CI 1.06 to 1.80, $p=0.018$). The difference between counselling alone and usual care was not significant. At 3 months abstinence remained highest in the NRT plus counselling group but the difference was not significant (table 3). Inclusion of the data available at discharge and at 3 months from the 123 participants recruited at the two London centres made no appreciable difference to these findings.

At 12 months abstinence rates were highest for the NRT plus counselling group and similar or lower in the counselling alone relative to the usual care group (table 3). The continuous validated abstinence rates for NRT plus counselling relative to counselling alone or usual care were 11%, 4%, and 8%, respectively ($p=0.25$), and for validated point abstinence 17%, 6% and 8% ($p=0.03$). The RR for continuous validated abstinence for NRT plus counselling versus the other two groups combined was 1.83 (95% CI 0.76 to 4.12, $p=0.15$), and for validated point abstinence the RR was 2.51 (95% CI 1.25 to 5.03, $p=0.009$). The effect of counselling alone was not significantly different from usual care (RR for validated point abstinence 0.58, 95% CI 0.18 to 1.88, $p=0.4$).

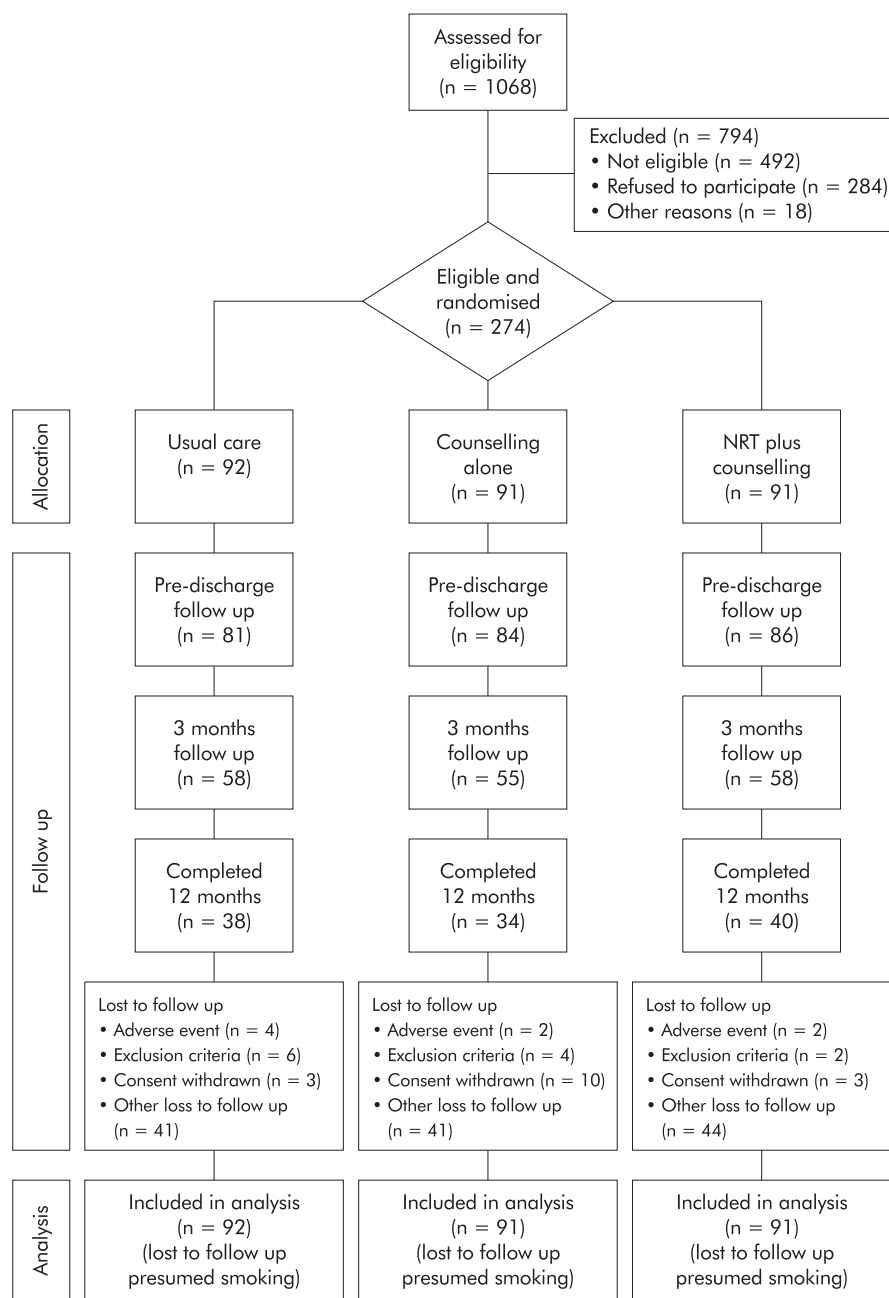


Figure 1 Flow of patients through study. NRT=nicotine replacement therapy.

Table 1 Baseline demographic characteristics and smoking history of all patients and by treatment groups

Baseline characteristics	All patients (n=274)	Usual care (n=92)	Counselling (n=91)	NRT + counselling (n=91)
Sex (% male)	163 (59.5)	54 (58.7)	51 (56.0)	58 (63.7)
Mean (SD) age	49.4 (15.7)	51.0 (15.8)	47.8 (15.3)	49.3 (15.9)
Ethnicity				
White	260 (95.9)	90 (98.9)	85 (95.5)	85 (93.4)
Black	10 (3.7)	1 (1.1)	4 (4.5)	5 (5.5)
Other	1 (0.4)	0	0	1 (1.1)
Smoking history				
Median (range) cigarettes/day	17 (1–80)	15 (1–60)	20 (3–40)	20 (3–80)
Mean (SD) years smoked	33.5 (16.2)	35.4 (16.0)	32.1 (15.8)	33.1 (16.6)
Median (IQR) FTND	5 (3–6)	5 (3–6)	4 (2–6)	5 (3–6)
Mean (SD) Glover-Nilsson	40.3 (10.3)	41.6 (10.5)	39.3 (9.5)	40.0 (10.7)
Any previous serious attempt to stop smoking, n (%)	222 (81.0)	73 (79.4)	73 (80.2)	76 (83.5)

NRT=nicotine replacement therapy; FTND=Fagerström test of nicotine dependence.

Table 2 Main admission diagnosis classified by system in the treatment groups

Main admission diagnosis	Usual care	Counselling	NRT + counselling	Total, N (%)
Respiratory	21	20	20	61 (22.3)
Cardiac	23	19	16	58 (21.2)
Gastrointestinal	16	17	16	49 (17.9)
Renal and urinary	7	9	9	25 (9.1)
Musculoskeletal, connective tissue and bone	2	7	6	15 (5.5)
General	5	5	4	14 (5.1)
Reproductive and breast	3	1	6	10 (3.6)
Vascular	3	2	3	8 (2.9)
Neurological	2	2	3	7 (2.6)
Injury	2	0	2	4 (1.5)
Other systems	7	9	6	22 (8.0)
Unknown	1	0	0	1 (0.4)
Total	92	91	91	274 (100)

NRT=nicotine replacement therapy.

Table 3 Number (%) abstinent before discharge and at 3 and 12 months follow up

Follow up	Self-reported point prevalence abstinence			Validated point prevalence abstinence			Validated continuous abstinence		
	Usual care	Counselling	NRT + counselling	Usual care	Counselling	NRT + counselling	Usual care	Counselling	NRT + counselling
Discharge	39 (42.4)	43 (47.3)	55 (60.4)*	34 (37.0)	39 (42.9)	50 (54.9)*	–	–	–
3 months	12 (13.0)	15 (16.5)	18 (19.8)	10 (10.9)	9 (9.9)	15 (16.5)	10 (10.9)	7 (7.7)	15 (16.5)
12 months	9 (9.8)	8 (8.8)	17 (18.7)	7 (7.6)	5 (5.5)	15 (16.5)†	7 (7.6)	4 (4.4)	10 (11.0)

NRT=nicotine replacement therapy.

*p=0.04 (χ^2 test); †p=0.03 (χ^2 test).

Reduction in cigarette consumption at 3 months was greater in the NRT plus counselling group than in the counselling alone or usual care groups but not significantly so (mean (SD) reduction 8.3 (9.0), 6.3 (9.3) and 3.3 (9.9) cigarettes per day, respectively). There was no significant difference between the three treatment groups at 12 months (p=0.56).

Quality of life

All dimensions of quality of life were similar across the three treatment groups at baseline and at 3 months. The dimension measuring role limitation due to physical problems alone differed between treatment groups at 12 months (p=0.05) with values on this score being better for those in the NRT plus counselling group than in the other two treatment groups.

Adverse events

There were 89 adverse events in a total of 65 patients, 33 of which were serious (three deaths and 30 other events, primarily due to complications of the admitting illness); there was no significant difference between the treatment groups. Five adverse events, none serious, were considered to be related to NRT (two skin rashes and one each of nausea, dizziness, and unpleasant taste).

DISCUSSION

This study shows that a smoking cessation package providing NRT with brief counselling significantly increases point prevalence abstinence at 1 year in hospital inpatients. The study also shows an increase of approximately twofold in continuous abstinence at 1 year that is consistent with the magnitude of the reported effect of NRT in outpatient and primary care populations,²⁰ but was not statistically significant in the present study. The effect of counselling alone was not significantly different from usual care.

Although 26% of patients screened were subsequently randomised, there was a wider range of admission diagnoses than in previous studies of NRT in hospital inpatients,^{11–13 15 21} and

patients' cigarette consumption was typical of the national UK population,²² suggesting that our findings may be more generalisable to the UK population of inpatient smokers than previous work.

As part of a pragmatic approach, those patients randomised to the NRT plus counselling group were given a free choice of a range of nicotine products. While there is no evidence to suggest that any product is significantly better than another,²³ patients overwhelmingly chose to use the transdermal patch which is the most widely purchased form of NRT in the UK (F Nilsson, personal communication, 2002). A previous study of smokers' preferences for NRT products has shown a similar pattern.²⁴ A small proportion (4%) of those randomised to counselling and NRT chose to refuse it, which may have distorted the true effect of NRT. Only a minority of patients obtained additional NRT after discharge, and the numbers did not vary significantly between treatment groups (data not shown). This study was not placebo controlled because we aimed to conduct a pragmatic study of the effectiveness of the routine delivery of a package of NRT and brief counselling, rather than to test the efficacy of NRT.

Our finding that counselling alone had no effect on smoking cessation in these patients conflicts with current evidence on the efficacy of similar interventions in clinical contexts outside hospital.^{25 26} This finding may be due to low study power, but it is possible that the lack of effect was due to the relatively brief nature of the counselling given, or to the fact that no follow up support was offered since counselling involving greater contact is associated with greater cessation rates.⁴ However, an alternative inference, which is supported by evidence from a systematic review of other hospital based trials that smoking cessation counselling without subsequent follow up is ineffective,¹⁶ is that brief counselling simply does not work in hospital inpatients. Further studies are necessary to determine whether more sustained behavioural support is more effective in this context.

This is the first randomised controlled trial to show the effectiveness of NRT measured as point prevalence abstinence at 12 months in smokers admitted to hospital. In contrast with

other studies of inpatient therapy in restricted disease subgroups,^{11–13 15 21} this study has addressed the effectiveness of routine service provision to patients admitted to hospital regardless of diagnosis, and suggests that NRT given in association with brief counselling is effective, although further larger studies are needed to confirm whether there was a real effect on continuous abstinence. Subgroup analysis of our results revealed a similar effect of NRT with brief counselling in patients with and without smoking related diseases (data not shown). Our findings are in contrast to a recent paper in which Hand and colleagues showed that a 3 week course of NRT given in conjunction with intensive counselling (four sessions lasting up to 2.5 hours in total) did not significantly increase cessation rates over counselling alone in hospital patients with smoking related disease who were willing to see a counsellor.¹⁵ Possible reasons for the failure of NRT in this study include the restriction to patients with smoking related diseases, a group which may be less successful at stopping smoking than other hospital patients,^{27–29} that NRT may not be effective in hospital patients, and that the course of NRT given may have been too short, although the 1 year cessation rate in the counselling group was 14% compared with 7% in our study, suggesting that greater counselling input was more effective. Our findings, taken in conjunction with those of Hand *et al*, suggest that either NRT or intensive counselling are similarly effective in hospital patients, but that NRT plus brief counselling is a more practically applicable approach. We conclude that, in the absence of contraindications, NRT should be given with brief counselling as a routine therapy to all smokers admitted to hospital who indicate that they are prepared to try to stop smoking.

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